



# ICAO ENGINE nvPM EMISSIONS DATA SHEET

## SUBSONIC ENGINES

ENGINE IDENTIFICATION: SaM146-1S18 BYPASS RATIO (-): 4.4  
 UNIQUE ID NUMBER: 01P11PJ004 PRESSURE RATIO  $\pi_{co}$  (-): 22.8  
 COMBUSTOR:  
 ENGINE TYPE: MTF RATED OUTPUT  $F_{co}$  (kN): 72.7

### REGULATORY DATA

CHARACTERISTIC VALUES:	$LTO_{mass}/F_{co}$ (mg/kN)	$LTO_{num}/F_{co}$ (particles/kN)	NVPM MASS CONCENTRATION ( $\mu\text{g}/\text{m}^3$ )
$LTO/F_{co}$ AND MAX $nvPM_{mass}$	336.0	2.89E+15	1099
AS % OF CAEP/10 LIMIT	-	-	14.0
AS % OF CAEP/11 LIMIT (InP)	10.9	15.6	
AS % OF CAEP/11 LIMIT (NT)	44.9	32.0	

### MEASURED DATA

MODE	POWER SETTING (% $F_{co}$ )	TIME minutes	FUEL FLOW kg/s	EMISSIONS INDICES*		NVPM MASS CONCENTRATION PEAK $nvPM_{mass}$ ( $\mu\text{g}/\text{m}^3$ )
				$EI_{mass}$ (mg/kg)	$EI_{num}$ (particles/kg)	
TAKE-OFF	100	0.7	0.841	166.0	1.03E+15	
CLIMB OUT	85	2.2	0.691	124.0	1.09E+15	
APPROACH	30	4.0	0.238	2.7	1.30E+14	
IDLE	7	26.0	0.100	1.7	5.23E+13	
LTO TOTAL (kg, mg, number of particles)			339	17574	1.51E+17	-
NUMBER OF ENGINES			1	1	1	1
NUMBER OF TESTS			3	3	3	3
AVERAGE $LTO/F_{co}$ VALUES (mg/kN, particles/kN)			242.0	2.08E+15	-	-
MAX EI VALUES (mg/kg, particles/kg) AND MAX MASS CONC. ( $\mu\text{g}/\text{m}^3$ )			166.0	1.11E+15	854	

\* Emissions Indices are corrected for thermophoretic loss and fuel hydrogen content

### DATA FOR EMISSIONS INVENTORIES (ESTIMATIONS FOR ENGINE EXIT PLANE VALUES)

MODE	POWER SETTING (% $F_{co}$ )	CORRECTED EMISSIONS INDICES	
		$EI_{mass_{SL}}$ (mg/kg)	$EI_{num_{SL}}$ (particles/kg)
TAKE-OFF	100	193.0	2.58E+15
CLIMB OUT	85	149.0	3.05E+15
APPROACH	30	4.3	7.85E+14
IDLE	7	2.4	2.56E+14

### AMBIENT CONDITIONS

	From	To	FUEL	
BAROMETER (kPa)	99.3	100.4	HEAT OF COMBUSTION (MJ/kg)	43.10
TEMPERATURE (K)	286.4	299.2	HYDROGEN CONTENT (%mass)	13.77
HUMIDITY (kg water/kg dry air)	0.0062	0.0125	AROMATICS CONTENT (%vol)	17.9
			NAPHTHALENE CONTENT(%vol)	1.37
			SULPHUR CONTENT (ppm by mass)	694

MANUFACTURER: PowerJet S.A.  
 TEST ORGANIZATION: PowerJet S.A.  
 TEST LOCATION: Villaroche, France  
 TEST DATES: 04/06/2019-07/06/2019

### REMARKS

1. Test engine 146009-1B
2. Certification report CR-037 S2 / CR-137 / CR-237 Rev1